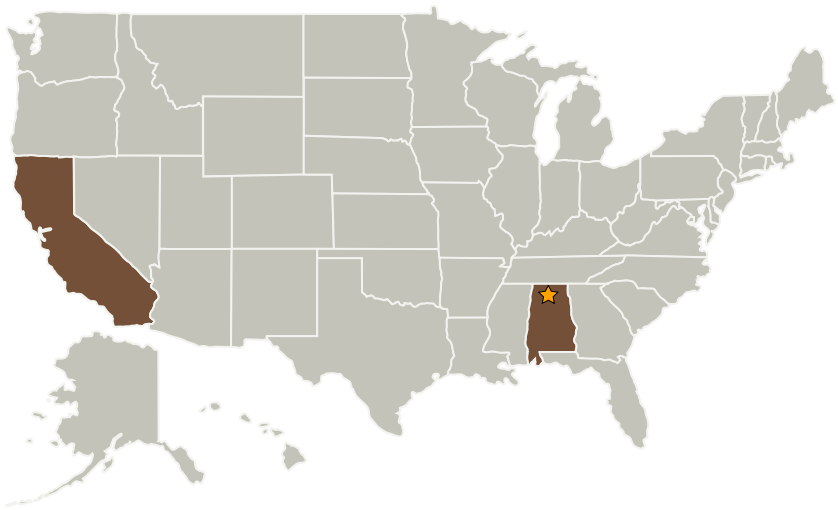
Near Real-Time, Microchip Assay of Aerosol Chemical Composition, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

A compact, autonomous and rugged instrument to measure the concentration of inorganic ions, and possibly organic acids, in atmospheric aerosols is proposed. This instrument will combine an innovative method for particle concentration and collection with emerging ?laboratory on a chip? analytical methods. The analytical microchip, measuring a few centimeters across, will contain all of the critical components for chemical quantitation, including the collection reservoir, capillary electrophoresis separation column and conductivity detector. Atmospheric aerosol will be deposited directly on the analytical chip using a new, thermally diffusive, laminar flow, water condensation technology that enlarges nanometer diameter particles into the micrometer size range. Transfer from the collection reservoir to the separation channel will be accomplished electrodynamically. Within the column, ions are separated by electrophoresis, and detected by conductivity. Cations and anions will be determined quantitatively. Subsequent work could expand this approach to organic acids. This instrument is in direct response to NASA solicitation for ?systems and devices for measurement of atmospheric aerosol chemical.. properties?. It further fits the stated desire for ?autonomy.. for ground-station network applications and deployment aboard aircraft.? The system will be automated, yielding continuous, 5-min data at global background concentrations.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Aerosol Dynamics, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Berkeley, California

Primary U.S. Work Locations	
Alabama	California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Susanne Hering

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic